

Fundamentals of color teaching in post-graduate education

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ABSTRACT

In this research we present a framework on the theory of color culture and science education in the context of a master program in Color Design & Technology organized in Italy since 2014. The master is organized in three main phases: Fundamentals, Project Work and Internship. The first phase is composed of lectures and theoretical lessons that gives the students a base from theory and technique, relating to disciplines such as physics, optics, colorimetry, psychology and perception. Fundamentals give all the base knowledge that the students are then asked to integrate in the project works, to propose and develop color projects for different design assignments, and in the Internship, that establish a link between the academia and companies who work with color in various fields like design, architecture, textiles and paints. Here the Fundamentals will allow the students to build up their future professional experience in the chosen field.

Keywords: *color design, color education, post-graduate education, multidisciplinary teaching*

INTRODUCTION

The Specializing Master in Color Design and Technology, held in collaboration with Associazione Italiana Colore and Politecnico di Milano, aims to provide advanced training to professionals, to enable them to understand and manage the many technological and design issues, across many disciplinary areas. In fact, in many different industrial and professionals sectors the use and management of color is fundamental.

In the master's program the students have the possibility to face with different areas where color is an issue, like fashion, advertisement, product design, architecture, entertainment and urban planning. In this context color is not considered as a simple attribute of objects, but as a mean of expression and design useful to communicate, transmit messages and interact with the reality. Particular attention will be paid to color perception, from a physiological point of view, but also from a psychological and emotional ones.

This post-graduate master is organized in three main phases, the Fundamentals, the Project Work and the Internship. The first phase focuses on the theory to train students on the technical aspect of measurement, reproduction, comparison and design of colors, employing disciplines like physics, optics, colorimetry, chemistry, psychology and perception. The second phase focuses on the practical application of the methods learned during the lessons on different areas like interior design, urban spaces, industrial products, fashion and communication. At the end of the Fundamentals and Project Work, the students have the possibility to work in strict contact with professionals during the internship phase.

In this work we want to focus on the Fundamentals, that are dedicated to developing basic skills in terms of the theories, methods and tools of color design.

The Fundamentals are frontal lessons divided in four main subjects that are the bones of color consulting: History and perception of color, Colorimetry and color systems, Digital color and Color applications. The lessons are held by specialists, professionals and academics who provide contributions in the research and application of color perception and design.

FUNDAMENTALS

The Fundamentals are organized during the first three months of the master giving to the students the possibility to face with all the different purposes of colors study and to see all the applications in heterogeneous domains.

At the beginning, we present the theme of color from a physical point of view, as electromagnetic radiation, and we show application on how the light interacts with different materials. Hence, we link the study of the physics of colors with material diagnostic and pigment/colorants characterization. Considering the analysis of the materials some lessons are dedicated to the chemistry of colors and to them contributes also the experience of some of the biggest producers of varnish for interior/exterior design.

The study of the materials is combined with lessons about the psychology of color and color naming. Different experts from those fields are called to teach the bond between color, culture, linguistic and psychology. In this context, the multicultural environment deriving from students coming from different countries and nations turns on the class discussion increasing the learning ability.

A particular attention is given to light and light design in the process of formation and valorization of color. Experiments are set up in the classrooms and the students in first person have the possibility to learn how to use different instruments for light measurements and to understand how the lights asset can change the perception of colors.

During the Fundamentals the students have the possibility to interact with experts in design application such as jewelers, fashion designer and interior designer, but also to discuss about copyright and law, and to discover how to manage the digital color for advertisement or film restoration (Figure 1).

The Fundamentals are composed by four main didactic units: History and perception of color, Colorimetry and color systems, Digital color and Color applications.

History and perception of color

“What is color for you?”. This is one of the first question that we make to our students and it is one of the hardest to answer. We are surrounded by colors and for us them have strong emotional, cultural and symbolic valence, since the antiquity. Colors are used to provoke emotions or highlights actions and messages. Due to this it is important to understand and learn what is a color. In this module the study of color is presented starting from an historical, social and artistic point of view and then the aspect of visual perception is investigated (Ball 2003, Rossi 2016). The perceptual mechanisms that affect the color and vision in general will be examined and understood in order to enable the student to recognize, anticipate and design them (Hoffman 2009).

Furthermore, students learn also the basis of color naming in different cultures and through the history, to better understand the development of the culture of color in different world area and in the civilization process (Berlin and Kay 1969).

Colorimetry and color systems

We use to define this module as “the mathematical side of color”, because it is dedicated to the color physics, chemistry and optics (Wyszecki and Stiles 2000). Despite the cultural and subjective characteristics of color studied during the first module, colorimetry is a fundamental means to manage and communicate color. It allows to measure, standardize and represent colors in an accurate way. Here we present the basis of physics of color formation, starting from the electromagnetic radiation to notion of matter-light interaction, then the basis of perception and colorimetry are presented (Oleari 2008). In this module, students learn the main difference between different color modes and color spaces and the methods to calculate color differences.

To the students are presented the main color systems in use among science, arts and industry like Munsell, Pantone, NCS and RAL. This module allows the student to manage the basis of color design and gives them the essential skills that are at the base of color design techniques.

Digital color

Nowadays for color managers, colorists and color designer it is fundamental to face with new technologies and to be able to control color physically and digitally. This module provides the theoretical and practical fundamentals to manage, view and reproduce digital color in different media. At first the students learn what is a digital color and how digital devices reproduce it, notions of color calibration, characterization and gamut are given (McCann and Rizzi 2011). The module provides a comprehensive knowledge of the processing chain and digital reproduction, with particular attention to the limits and the issues associated with the use of different color profiles (Ramanath et al. 2005).

In addition, students are given the possibility to make different application of color correction and color grading for advertisement or artistic purpose, facing with the great potentials that the digital means offers.

Color applications

The module of color application is spread all along the Fundamentals lessons and gives to the students the possibility to learn from experts, professionals and artists from different fields like architecture, jewelry, interior design, photography and many others.

Color applications aims to provide the students with consciousness of color choices based on experience, preparation and diligence. In this module different examples and case studies are provided from different contexts like marketing, visual communication, restoration of cultural heritage, film and more. The aim of this module is to show how the knowledge acquired in the previous modules can be applied in most professional fields and applications (Braddock and O'Mahony 1999, Fletcher 2004, Lefteri 2001).



Figure 1: Pictures taken during the Fundamentals.

CONCLUSION

In this paper we have presented the structure of the first part of the Master in Color Design and Technology and we have demonstrated the importance to give to the students a multidisciplinary base knowledge to face with professionals and experts.

At the end of this specializing master, students will be able to professionally manage different aspects of color thanks to the interdisciplinary nature of the course. The professional figure resulting from is widely demanded by the market, with advanced technical and design skills concerning color use and control and color design in research and in several sectors.

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